A refined draw solute flux model in FO

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Introduction

Flux modeling in FO:

- Often only model J_w
- RO for membrane characterization
- Often only use NaCl draw solute

This model

- 4 DS, 2 membrane types, both orientations
- Concentration-dependent diffusion of DS
- DS properties: density, viscosity, diffusivity
- Validation: batch FO tests

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Supporting publication:
D'Haese et al.(2017), JMS 522, 316-331

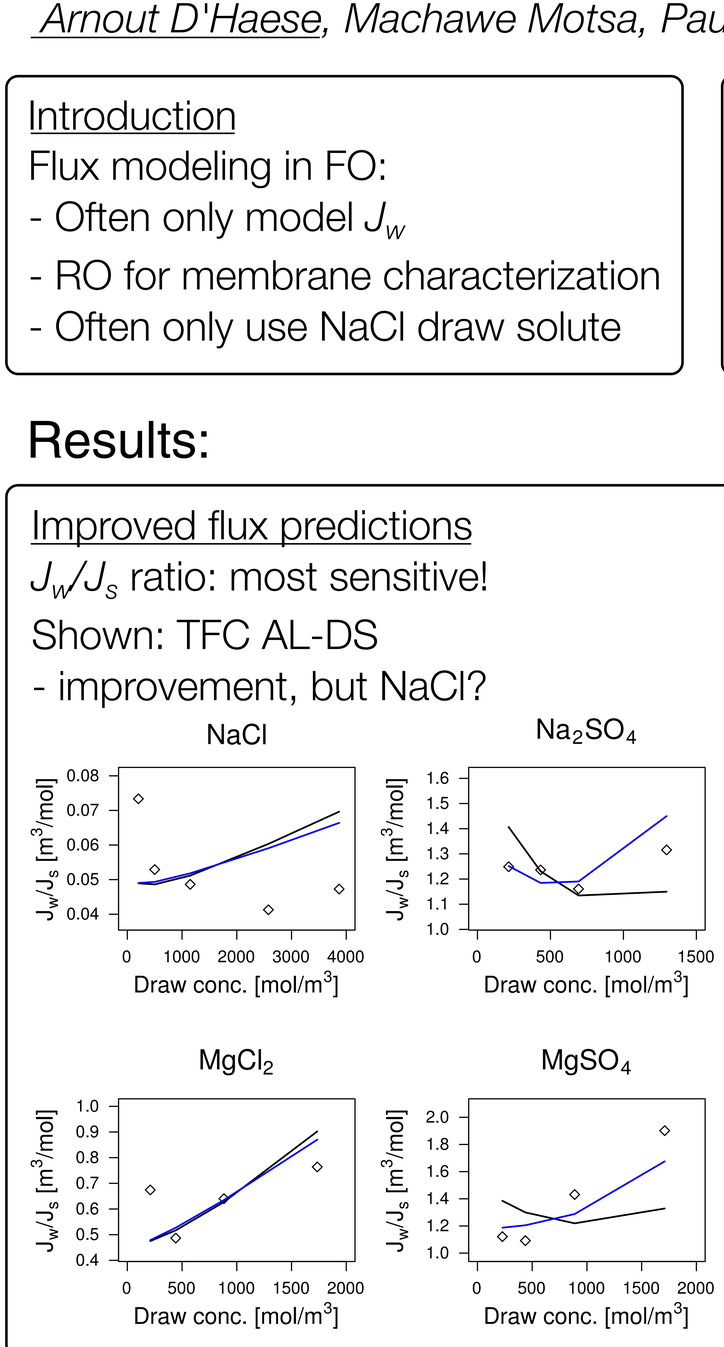
Results:

Improved flux predictions

J_w/J_s ratio: most sensitive!

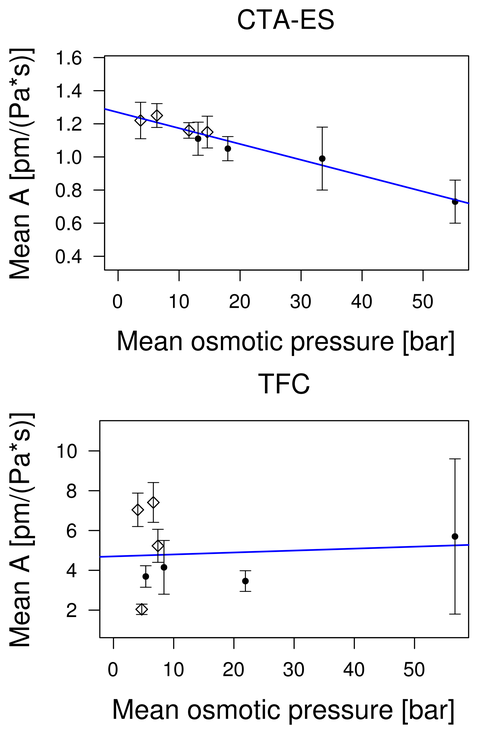
Shown: TFC AL-DS

- improvement, but NaCl?



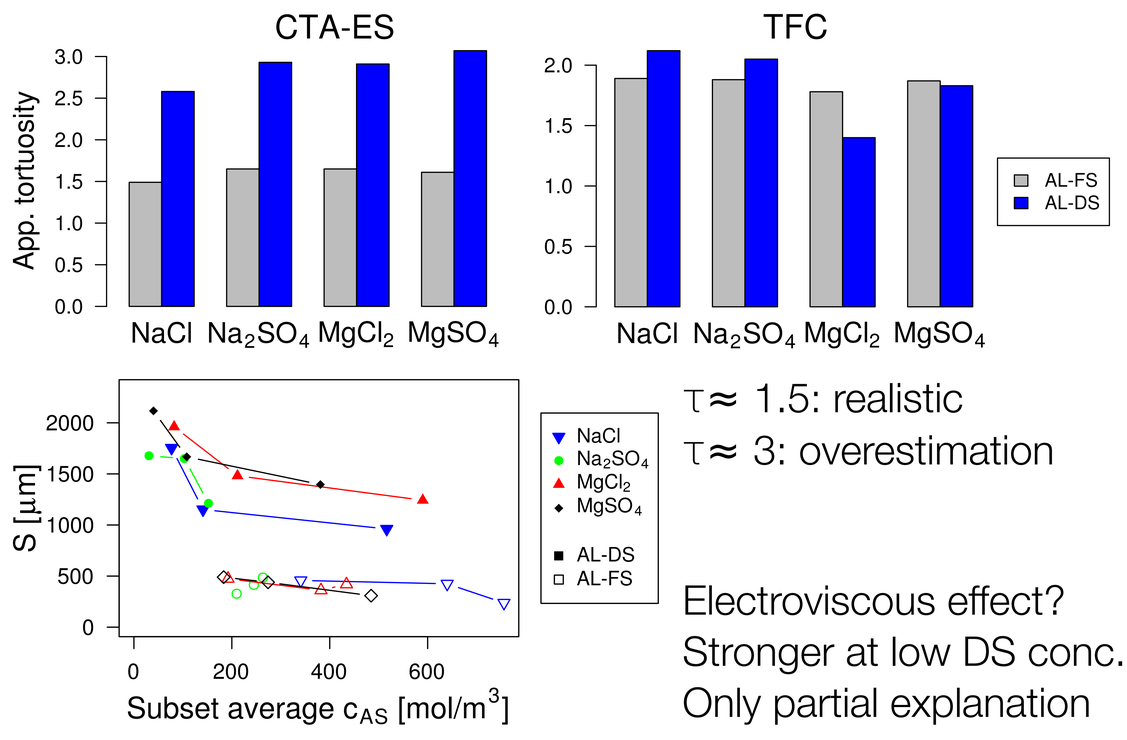
CTA: osmotic dehydration

TFC: resistant



Apparent tortuosity: AL-FS vs AL-DS difference

CTA: large difference, TFC: small difference



τ ≈ 1.5: realistic

τ ≈ 3: overestimation

Electroviscous effect?

Stronger at low DS conc.

Only partial explanation